

## SCIENTIFIC SERIALS

*Poggendorff's Annalen der Physik und Chemie*, No. 10.—This number contains several papers of great interest: the first is by G. Quincke, on electric currents resulting from the non-simultaneous insertion of two mercury-electrodes into different liquids. The author bases his experiments upon those of St. Claire Deville and Troost, who found it probable that platinum absorbs hydrogen or other gases when being heated in a gas or alcohol flame, and then shows a different electric action towards water and dilute acids from that of platinum that has not been so heated. The paper contains a minute description of the apparatus used and tables of the results obtained; in an appendix the author treats of the relation between capillary and electrical phenomena, referring to G. Lippmann's paper (*Pogg. Ann.*, vol. 149, p. 556), from whom he materially differs.—Experiments made with a magnetised copper wire, by Prof. Balfour Stewart and Dr. A. Schuster.—On the chemical action of the solar spectrum upon haloid salts of silver, by H. W. Vogel. Chloride, bromide, and iodide of silver, are not only sensitive towards the highly refrangible rays of the spectrum, but also towards the less refrangible ones, although in a much smaller degree; their sensitiveness does not only depend upon their optical power of absorption of the respective rays, but also upon the absorption power of other substances they may be mixed with. Coloured substances which assist the photographic reduction process and absorb certain spectral rays, highly increase the sensitiveness of the silver salt towards the absorbed rays; thus the sensitiveness of silver salts for red, yellow, and green rays can be greatly augmented. Certain colourless bodies are found to have a similar action. The light reflected from pigments shows a very different effect from that of spectral colours, on account of the varying optical composition of artificial colours and their smaller intensity.—On the question of velocity of magnetic action at distances, by H. Herwig; investigations relating principally to terrestrial magnetism. It is found that this velocity is at least half a million geographical miles (or about  $2\frac{1}{2}$  millions of English miles) per second; in other words, that at any given spot on the surface of the earth terrestrial magnetism becomes fully active in less than the 300th part of a second.—On a modification of the magneto-electric revolution experiment, by the same.—On comparison of electric machines, by Mr. Mascart. The author describes experiments made to ascertain the actual quantity of electricity produced by eleven different machines in a given time and under the same conditions.—On the measuring of the electromotive power of voltaic piles in absolute units, by A. Crova.—The frequency of changes of colour in the scintillation of stars is generally related to the spectrum they show, by C. Montigny. Stars that twinkle strongly show few spectral lines, while those with little scintillation have many bands and lines in their spectra.—On the theory of organ-pipes, by H. Schneebeli.—Is the application of the *vis viva* justified in the mechanical theory of heat? by H. Fritsch. The author answers this question in the negative.—On induction-effects in magnets of different hardness, by L. Kulp.

## SOCIETIES AND ACADEMIES

## LONDON

Royal Society, Jan. 7.—“Remarks on a New Map of the Solar Spectrum,” by J. Norman Lockyer, F.R.S.

I beg permission to lay before the Royal Society a portion of the new map of the solar spectrum, referred to in one of my former communications.

It consists of the portion between w. l. 39 and 41.

I have found it necessary, in order to include all the lines visible in my photographs in such a manner that coincidences may be clearly shown, to construct it on four times the scale of Angström's “Spectre-Normal.”

The spectra of the following elements have been photographed side by side with the solar spectrum, and the coincidences shown:—

Fe, Co, Ni, Mn, Ce, U, Cr, Ba, Sr, Ca, K, Al.

The wave-lengths of new lines in the portion of this spectrum at present completed have been obtained from curves of graphical interpolation. Instead of the reading of a micrometer-scale, a photographic print of the spectrum has been employed in the construction of these curves, the wave-lengths of the principal lines being taken from an unpublished map of the ultra-violet region of the solar spectrum, a copy of which has been kindly placed at my disposal by M. Cornu. The photograph of the

solar spectrum, from the ultra-violet to beyond F, kindly given to me by Mr. Rutherford, has also proved of great service in the present work. I have, in fact, up to the present time, only been able to excel this photograph in the region about H.

From the extreme difficulty of carrying on eye-observations upon the portion of the spectrum now completed, Angström's map is, of course, very incomplete about this region. The few lines mapped differ slightly in some cases from the positions assigned by Cornu; but the wave-lengths given by the latter observer generally fall into the curve without breaking its symmetry, and these positions have therefore been adopted. The advantage possessed by the photographic method over eye-observation may be estimated from the following numerical comparisons:—

Region of spectrum, 3900–4100.			
Number of lines in Angström's “Spectre-Normal”	...	...	39
” ” Angström's and Thalén's map of the	...	...	185
” ” violet part of the solar spectrum	...	...	205
” ” Cornu's map	...	...	518
” ” New Map	...	...	...

It will serve further to illustrate the advantages of the photographic method, to compare the number of lines in the spectra of metals already observed with the number of lines of the same metal given by Angström in the “Spectre-Normal.”

Region of spectrum, 3900–4100.			
Metal.	Lines in new map.		Lines in Thalén's map.
Fe	...	71	19
Mn	...	53	12
Co	...	47	—
Ni	...	17	—
Ce	...	163	—
U	...	18	—
Cr	...	24	—
Ba	...	7	—
Sr	...	5	—
Ca	...	7	6
K	...	2	—
Al	...	2	2
Total	...	416	39

The purification of the various metallic spectra has at present been only partially effected; but I have seen enough already to convince me of the extreme rigour with which the principle I have already announced may be applied, while at the same time there are evidences that the application of it may lead to some results not anticipated in the first instance.

My object in laying these maps before the Society, and presenting this *ad interim* report of progress, is to appeal to some other man of science, if not in England, then in some other country, to come forward to aid in the work, which it is improbable that I, with my small observational means and limited time, can carry to a termination. I reckon that, having regard to routine solar work, it will require another year before the portion from H to G is completely finished, even for the metals the spectra of which are shown in the maps now exhibited. When this is done there will still remain outstanding all the ultra-violet portion, the portion from G to F, both capable of being photographed by short exposure, and the whole of the less refrangible part, which Draper and Rutherford have both shown can be reached by long exposure with the present processes.

I cannot but think, moreover, that when the light which the spectroscopist has already thrown upon molecular action shall be better known, and used as a basis for further inquiry, methods of photography greatly exceeding the present one in rapidity, in the less refrangible portion of the spectrum, will be developed and utilised in the research.

The map is being drawn by my assistant, Mr. Raphael Meldola (to whom my thanks are due for the skill and patience he has brought to bear upon the work), in the first instance with more especial reference to the positions, thicknesses, and individualities of the lines; the final revision will consist of an absolute intensity reproduction of the photographs.

“On the Spectrum of Coggia's Comet,” by William Huggins, D.C.L., LL.D., F.R.S.

From his observations of five small comets in the years 1866, 1868, and 1871, the author had shown that a great part of the light of those comets was emitted by the cometary matter; and further, that carbon, in some form, was probably present in them.

Coggia's Comet presented in the spectroscope three distinct spectra :—

1. A continuous spectrum from the light of the nucleus.
2. A spectrum of bright bands.
3. A continuous spectrum accompanying the gaseous spectrum on the coma, and representing almost entirely the light of the tail.

The author then gives his observations of three different spectra, and of the relative intensity of the two latter spectra in different parts of the comet.

On acoustic reversibility, by J. Tyndall, D.C.L., LL.D., F.R.S. In this paper Prof. Tyndall refers to the series of experiments on the velocity of sound which were made on the 21st and 22nd of June, 1822, between Villejuif and Monthéry, south of Paris, and 11·6 miles distant from each other.

On this occasion it was noticed that while every report of the cannon fired at Monthéry was heard with the greatest distinctness at Villejuif, by far the greater number of the reports from Villejuif failed to reach Monthéry. The air at the time was calm, the slight motion of translation actually existing being from Villejuif towards Monthéry, or against the direction in which the sound was best heard.

So far as the author knows, no explanation of this has hitherto been given.

Experimenting with a sensitive flame, from 18 to 24 inches in height, and a reed, less than a square quarter of an inch in area, on a screen of cardboard, 18 inches high by 12 inches wide, in all cases it was shown that the sound was effective when the reed was at a distance from the screen and the flame close behind it; while the action was insensible when these positions were reversed.

It was observed and recorded when the experiments of 1822 were made, that while the reports of the guns at Villejuif were without echoes, a roll of echoes, lasting from twenty to twenty-five seconds, accompanied every shot at Monthéry, being heard by the observers there.

From various considerations the author infers that Monthéry, on the occasion referred to, must have been surrounded by a highly diacoustic atmosphere; while the shortness of the echoes at Villejuif shows the atmosphere surrounding that station to have been acoustically opaque.

The non-homogeneous air surrounding Villejuif is experimentally typified by the screen with the source of sound close behind it; the upper end of the screen representing the place where equilibrium of temperature was established in the atmosphere above the station. In virtue of its proximity to the screen, the echoes from the sounding-reed would, in the case here supposed, so blend with the direct sound as to be practically indistinguishable from it, as the echoes at Villejuif followed the direct sound so hotly, and vanished so rapidly, that they escaped observation. And as the sensitive flame, at a distance, failed to be effected by the sounding body placed close behind the cardboard screen, so, the author takes it, did the observers at Monthéry fail to hear the sounds of the Villejuif gun.

Something further may be done towards the experimental elucidation of this subject. The facility with which sounds pass through textile fabrics has been already illustrated; a layer of cambric, or even of thick flannel or baize, being found competent to intercept but a fraction of the sound from a vibrating reed. Such a layer of cambric may be taken to represent a layer of air differentiated from its neighbours by temperature or moisture; while a succession of such sheets of cambric may be taken to represent successive layers of non-homogeneous air.

Two tin tubes with open ends were placed so as to form an acute angle with each other. At the end of one is the vibrating reed; opposite the end of the other, and in the prolongation of its axis, is a sensitive flame—a second sensitive flame being placed in the continuation of the axis of the first tube. On sounding the reed, the direct sound through the first tube agitates the second flame. Introducing the square of cambric at the proper angle, a slight decrease of the action on the second is noticed, and the feeble echo from the cambric produces a barely perceptible agitation of the first flame. Adding another square, the sound transmitted by the first square impinges on the second. It is partially echoed, returns through the first square, passes along the second tube, and still further agitates the flame opposite its end. Adding a third square, the reflected sound is still further augmented, every accession to the echo being accom-

panied by a corresponding withdrawal of the vibrations from the flame opposite the first tube, and a consequent stilling of that flame.

With thinner cambric it would require a greater number of layers to intercept the entire sound. Hence, with such cambric, we should have echoes returned from a greater distance, and, therefore, of greater duration.

Jan. 14.—“On a Class of Identical Relations in the Theory of Elliptic Functions,” by J. W. L. Glaisher, M.A., Fellow of Trinity College, Cambridge; communicated by James Glaisher, F.R.S.

Chemical Society, Jan. 14.—Prof. Odling, F.R.S., president, in the chair.—On the action of the organic acids and their anhydrides on the natural alkaloids, Part III., by Mr. G. H. Beckett and Dr. C. R. A. Wright, was read by the latter. It is a continuation of their researches on the opium alkaloids morphine and codeine.—The next communication was a note on the effect of passing the mixed vapours of carbon bisulphide and alcohol over red-hot copper, by Mr. T. Carnelly.—Dr. H. E. Armstrong then read a paper on the iodonitrophenols.

Anthropological Institute, Jan. 12.—Prof. Busk, F.R.S., president, in the chair.—Mr. T. J. Hutchinson, F.R.G.S., late H.M.'s Consul, Callao, read a paper on the anthropology of Prehistoric Peru. The paper commenced with a notice of how little is known up to the present time about the glorious days of Peru long before the time of the Incas, agreeing with Mr. Baldwin as to the original South Americans being the oldest people on that continent. The grandeur of colossal works in the extent of the ancient burial mounds was shown by illustrations. A comparison of these examined by the author in Peru was made with those explored by Messrs. Squier and Davis in the valleys of the Ohio and the Mississippi. The prehistoric architecture of Peru, described by Prof. Raimondi in his recent work on the mineral riches of the department of Aucachs, were mentioned as highly interesting; more particularly the tombs cut out of solid blocks of diorite in the valleys where sandstone is the geological character; thus proving the enormous capacity for work of the ancient Peruvians in transporting these stony masses over the Andes. So small was the author's faith in Spanish accounts of South America, that he inclined to the belief in some future explorer finding the mythical “cradle of the Incas” in the National Library at Madrid, instead of in the Lake of Titicaca, to which latter place it is accredited by the Hakluyt Society.—A paper, by Dr. George Dobson, was read on the Andamans and Andamanese. After giving a sketch of the geographical position of the Andaman Islands and their geological and zoological relations to the Asiatic continent, the author passed in review the various theories that had been propounded by eminent biologists to account for the origin of the Andamanese. He strongly inclined to the views of Mr. Wallace and M. Quatrefages that the Andamanese are Nigritos, or Samangs from the Malay peninsula, and was opposed to the theory of their descent from shipwrecked African negroes, on the ground rather of the dissimilarity of their manners and customs than of their physical characteristics. It was impossible, however, to account for the presence of the wild tribes of Southern India or of the peculiar Samangs of the interior of the Malay peninsula, surrounded by races with which they have no connection whatever, except on the hypothesis that they are the few surviving descendants of a woolly-haired people which in ages past occupied lands south of the Himalayas when the continent of Asia included within its southern limits the Andamans, Nicobars, Sumatra, Java, Borneo, and the Philippine Islands; and that the present inhabitants of the Andamans and the Nigritos of the Philippines are also the remnant of those ancient Nigrito inhabitants of Southern Asia, which have almost disappeared before the invading Aryan and Mongolian races. Dr. Dobson exhibited a series of photographs, taken by himself, of Andamanese men and women.

Entomological Society, Jan. 4.—Sir Sidney Smith Saunders, C.M.G., president, in the chair.—Mr. Stevens exhibited varieties of *Diloba carulicephala* and *Hibernia defoliaria*, bred from larvæ taken near Brighton.—Mr. Smith exhibited a box of hymenopterous insects collected in the neighbourhood of Calcutta by Mr. Rothney. It comprised several rare species of *Formicidae* and *Fossoræ*, and also many undescribed species of *Apide*, amongst which were two species of *Nonia*, one of them with remarkable capitate antennæ.—Mr. M'Lachlan made some remarks on the December Moth (*Cheimatobia brumata*), which he had observed one evening during the recent severe frost

\* Phil. Trans., Feb. 1874.



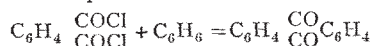
attracted in great numbers to the gas lamps in the neighbourhood of Lewisham. Mr. Weir remarked on the importance of ascertaining whether they were hibernated specimens or whether they had been newly hatched during the severe weather.—A letter was read from Mr. R. S. Morrison, of George Town, Colorado, expressing a wish to be placed in communication with any entomologists who might be interested in the insect faunas of the higher altitudes (8,000 to 14,000 ft.), which he considered should be more fully investigated.—The Secretary exhibited a small bottle containing specimens of a *Mantis*, forwarded to him from Sarawak by Mr. de Crespigny. He stated that while sitting at table his notice was attracted by the unusual appearance of a column of ants crossing it; but on looking more narrowly he observed that they were not ants, but a species of *Mantis*, and he believed them to be full-grown insects, but that they had no wings. Mr. McLachlan, however, observed that some of the specimens had rudimentary wings; and the President and others expressed a belief that they would prove to be larvæ, and not perfect insects.

Institution of Civil Engineers, Jan. 12.—Mr. Thos. E. Harrison, president, in the chair.—The paper read was on the construction of gasworks, by Mr. Harry E. Jones.

## BERLIN

German Chemical Society, Dec. 19.—Annual ordinary meeting; A. W. Hofmann, V.P., in the chair.—The vice-president reported on the state of the Society, which counts 1,209 members, while the reports are published to the number of 1,800 copies. The number of papers published through its means amounted to more than 500 during the last year. The elections called the resident officers back to their posts, while, as non-resident members of the committee, the following were elected for the new year:—Messrs. Baeyer, Griess, Ladenburg, Landolt, and Schorlemmer.

Dec. 28.—A. W. Hofmann, V.P., in the chair.—P. Wallach and A. Böhringer, in treating methylated oxamine with  $\text{PCl}_5$ , have produced a well-defined base yielding well-crystallised monobasic salts and a direct combination with  $\text{C}_6\text{H}_5\text{I}$ . The base  $\text{C}_6\text{H}_5\text{CIN}_2$  has received the name chloroxal methylene, and is homologous with  $\text{C}_6\text{H}_5\text{CIN}_2$  lately produced by Dr. Wallach from ethylated oxamine in a similar way.—I. Piccard has succeeded in producing anthracinone by heating, in closed tubes to  $220^\circ$ , benzol and phthalic chloride with zinc:



I. Siebel proposed as a method for producing soda the treatment of tribasic phosphate of soda with carbonic acid, adding subsequently carbonate of ammonia. The double phosphate of sodium and ammonium crystallises out, while two-thirds of the sodium, transformed into carbonate, remain in solution.—A. Oppenheim reported on a mechanical method for preventing the most frequent cause of the incrustation or furring of steam boilers, lately patented by a large boiler-maker, M. Paukoch, in Landsberg. Instead of introducing the water directly into the boiler, he lets it run slowly through a wide tube passing through the boiler. Here, on being heated, the water deposits its carbonate of lime before it is admitted into the boiler. As the inner tube is not in contact with the fire, the deposit in it cannot produce the usual dangerous results.

## PARIS

Academy of Sciences, Jan. 11.—M. M. Fremy in the chair.—The following papers were read:—On the mesaticephalic and brachycephalic fossil human races, by M. de Quatrefages, being the third part of the author's and M. Hamy's work on the skulls of the human races.—Report on M. Alph. Guérin's work, on the patho-genetic effect of fermentation products in surgical cases, and a new method of treatment of the amputated, by M. Gosselin.—MM. Bouilland and Pasteur then spoke in detail on the same subject; M. A. Trécul made some observations with regard to the production of vibriones and bacteria, in reference to the last subject.—Report on M. Halphen's memoir, concerning the important points of plane algebraic curves, by M. de la Gournerie.—On the existence of the integral in equations with partial derivatives, containing any number of functions and independent variables, by M. G. Darboux.—On the action of electrolytic oxygen on alcohol, by M. A. Renard; experiments made by the author, who exposed alcohol, to which about five per cent. of dilute sulphuric acid had been added, to an electric current from

four to five Bunsen cells, and analysed the products after forty-eight hours' action: he found ethylic formate and acetate, aldehyde, acetal, ethyl-sulphuric acid, and a new substance, ethylenic-monoethylate, which may be regarded as an acetal  $\text{C}_2\text{H}_5\text{O} \left\{ \begin{array}{c} \text{C}_2\text{H}_5\text{O} \\ \text{C}_2\text{H}_4 \end{array} \right\}$  in which one  $\text{C}_2\text{H}_5$  is replaced by H, thus possessing the formula  $\text{C}_2\text{H}_5\text{O} \left\{ \begin{array}{c} \text{C}_2\text{H}_5\text{O} \\ \text{HO} \end{array} \right\} \text{C}_2\text{H}_4$ .—On the "seiches" of Lake Lemán, by F. A. Forel. *Seiches* are the sudden rises and falls in the level of this lake. The author gives an explanation of these phenomena and considers them constant and frequent in all larger lakes, and not rare and accidental as was believed hitherto.—A note by M. Martha-Becker, relating to his paper on ether and the origin of matter.—A note by M. H. de Kerikuff, with corrections for his communication on the velocity of light and the parallax of the sun.—A note by M. Pouppelle, with regard to a system of electric danger signals to prevent railway collisions on a single line of rails.—On the reduction of equations with partial derivatives to ordinary differential equations, by M. W. de Maximovitch.—M. E. Flaquer communicates the observations and calculations made by the French Commission for the measuring of the arc of meridian between Barcelona and the Balearic Isles.—M. Lemonnier gives some new theories with regard to equations with common roots.—On the correction of Descartes' ovals, by M. A. Genocchi.—On some properties of the curvature of the surfaces, by M. Halphen.—On stratified light, by M. Neyreneuf.—On the specific rotative power of mannite, by M. G. Bouchardat; accounts of experiments made in M. Berthelot's laboratory.—M. P. Bouloumié communicates the results of his observations and researches on micro-organisms in suppurations, their influence on the healing of wounds, and the different means to prevent their development.—On white globules in the blood-vessels of the spleen, by MM. Tarchanoff and A. Swaen.—On the habits of a remarkable serpent of Cochín China: *Herpeton tentaculatum*, by M. A. Morice.

## BOOKS AND PAMPHLETS RECEIVED

BRITISH.—On the Recent Progress and Present State of Systematic Botany: George Bentham, F.R.S. (British Association).—Institution of Civil Engineers (Printed by Private Press).—Agricultural Gazette Almanack, 1875 (W. Richards).—Westminster Review, January 1875 (Trübner).—The Nagpur Waterworks: James Forrest (Clowes and Sons).

FOREIGN.—Note sur un procédé pour donner ou pour rendre leur couleur rouge aux muscles Conservés dans l'alcool: Félix Plateau (F. Hayez, Bruxelles).—Un parasite de l'Helioptères de Belgique: Félix Plateau (Académie Royale de Belgique).—Die Lösung der wichtigsten probleme in der Natur: Johann Friedrich Lochner (E. H. Mayer, Leipzig).—Les Comètes: Amédée Guillemin (Paris, Hachette and Co.).—In Sachen Darwin's insbesondere Contra Wigand: Dr. Gustav Jaeger (Stuttgart, E. Schweizerbart).—Annuaire de l'Académie Royale des Sciences, des Lettres, et des beaux-Arts de Belgique, 1875 (Brussels, F. Hayez).—Third Annual Report of the Director of the Imperial Mint, Osaka, Japan. Year ending July 31, 1874 (*Hieigo News Office*).—Der Darwinismus und der Naturforschung Newtons und Cuviers: Dr. Albert Wigand (Brunswick, F. Vieweg und Sohn).

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